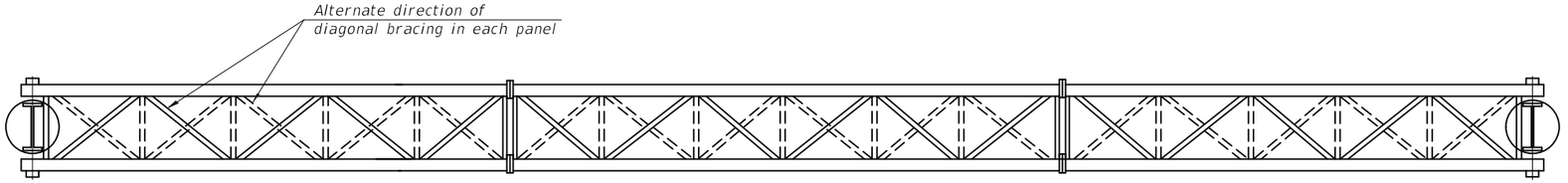
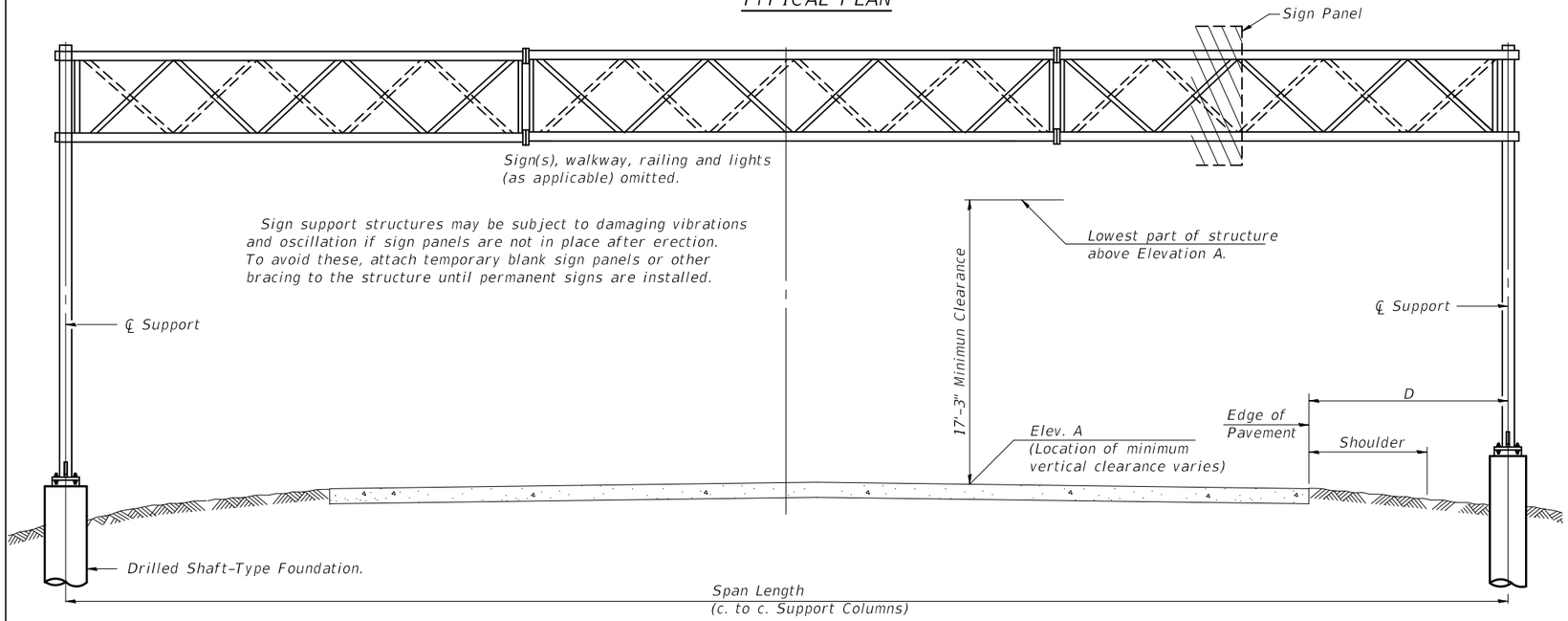
CELL / MODEL NAME	DESCRIPTION	DATE
TRI-S-1	General plan and elevation	2/17/2017
TRI-S-2	Steel truss details for truss types TRI-I-S, TRI-II-S, and TRI-III-S	2/17/2017
TRI-S-3	Steel truss details for truss types TRI-I-S, TRI-II-S, and TRI-III-S	2/17/2017
TRI-S-4	Damping device	2/17/2017
TRI-S-5	Truss support column	2/17/2017
TRI-S-6	Steel walkway details	2/17/2017
TRI-S-7	Steel sign bracket and walkway details	2/17/2017
TRI-S-8	Handrail details	2/17/2017
TRI-S-9	Drilled shaft foundation details	2/17/2017



TYPICAL PLAN



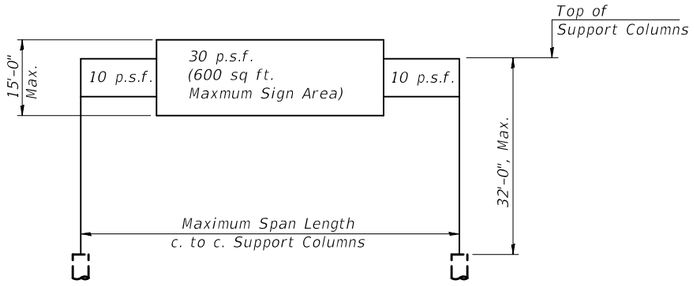
TYPICAL ELEVATION

(Looking at Face of Signs**)

Elev. A = Elevation at point of minimum clearance to sign, walkway support or truss.

Structure Number	Station	Design Truss Type	c. to c. Supports	Elev. A	Dim. D	Height of Tallest Sign	Total Sign Area

**Looking upstation for structures with signs both sides.



DESIGN WIND LOADING DIAGRAM

Parameters shown are basis for I.D.O.T. Standards and Sign Manual Tables. Installations not within dimensional limits shown require special analysis for all components.

GENERAL NOTES

DESIGN: AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. (2001, 4th edition, 2002 interim) ("AASHTO Specifications")

CONSTRUCTION: Current (at time of letting) Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, Supplemental Specifications and Special Provisions. ("Standard Specifications")

LOADING: 90 M.P.H. WIND

WALKWAY LOADING: Dead load plus 500 lbs. concentrated live load.

DESIGN STRESSES
FIELD UNITS
f'c = 3,500 psi
fy = 60,000 psi (reinforcement)

MINIMUM CLEARANCE: Vertical Roadway Clearance = 17'-3" (All Obstructions)

WELDING: All welds to be continuous unless otherwise shown. All welding to be done in accordance with current AWS D1.1 Structural Welding Code (Steel) and the Standard Specificiations.

MATERIALS: Structural steel pipe for chords shall be ASTM A500 Grade C. Structural steel pipe for perpendiculars and diagonals shall be ASTM A53 Grade B or A500 Grade B or C. If A500 pipe is substituted for A53, then the outside diameter shall be as detailed and wall thickness greater than or equal to A53.
All Structural Steel Plates and Shapes shall conform to AASHTO M270 Gr. 50 or ASTM A992 Gr. 50. The W24 columns and stiffening ribs at the base plate shall have a minimum longitudinal Charpy V-Notch (CVN) energy of 15 lb.-ft. at 40° F. (Zone 2) before galvanizing.

GALVANIZING: All steel grating, plates, shapes and pipe shall be hot dip galvanized after fabrication in accordance with AASHTO M111. All bolts, u-bolts, eye bolts, lock nuts and washers must be hot dip galvanized per AASHTO M232.

FASTENERS FOR STEEL TRUSSES: All bolts noted as "high strength" (HS) must satisfy the requirements of AASHTO M164 (ASTM A325), ASTM A449, or an Engineer approved alternate, and must have matching lock nuts and washers. All bolts, u-bolts, eye bolts, lock nuts and washers not specified to be "high strength" must satisfy the requirements of ASTM A307 Gr B. All lock nuts must have nylon or steel inserts. High strength bolt installation shall conform to Article 505.04 (f) (2)d of the Standard Specifications. Rotational capacity ("ROCAP") testing will not be required.

ANCHOR RODS: Shall conform to ASTM F1554 Gr. 105. Galvanize the upper 12" minimum per AASHTO M232.

CONCRETE SURFACES: All concrete surfaces above an elevation 6" below the lowest final ground line at each foundation shall be cleaned and coated with Concrete Sealer in accordance with the Standard Specifications.

REINFORCEMENT BARS: Reinforcement bars designated (E) shall be epoxy coated in accordance with the Standard Specifications.

FOUNDATIONS: The contract unit price for Drilled Shaft Concrete Foundations shall include reinforcement bars complete in place.

TOTAL BILL OF MATERIAL

ITEM	UNIT	TOTAL
OVERHEAD SIGN STRUCTURE - TRICHORD TYPE TRI-I-S	Foot	
OVERHEAD SIGN STRUCTURE - TRICHORD TYPE TRI-II-S	Foot	
OVERHEAD SIGN STRUCTURE - TRICHORD TYPE TRI-III-S	Foot	
OVERHEAD SIGN STRUCTURE - TRICHORD TYPE TRI-IV-S	Foot	
TRICHORD SIGN WALKWAY TYPE S	Foot	
DRILLED SHAFT CONCRETE FOUNDATIONS	Cu. Yds	

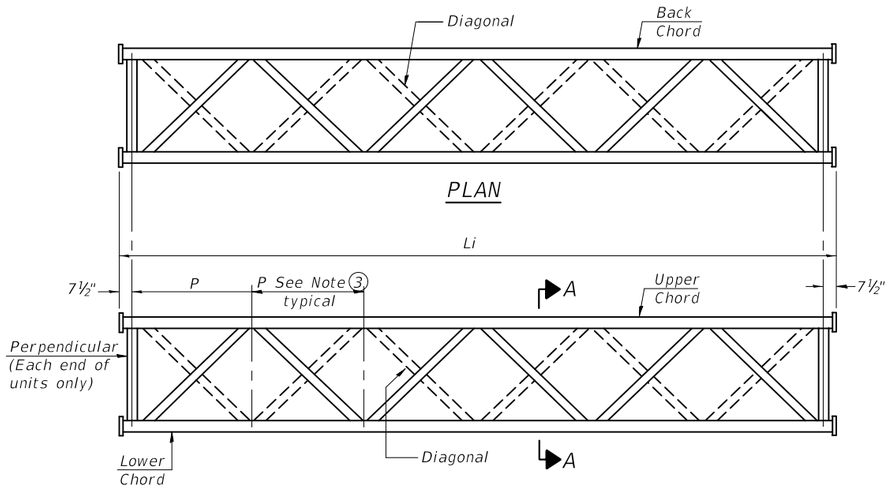
TRI-S-1 2-17-2017

FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

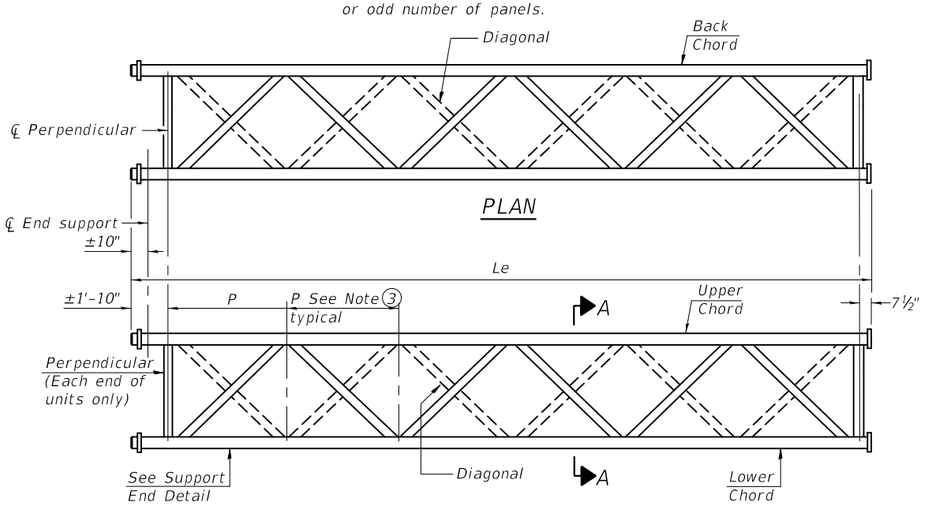
TRI-CHORD SIGN STRUCTURES - GENERAL PLAN & ELEVATION - STEEL TRUSS & STEEL SUPPORTS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		



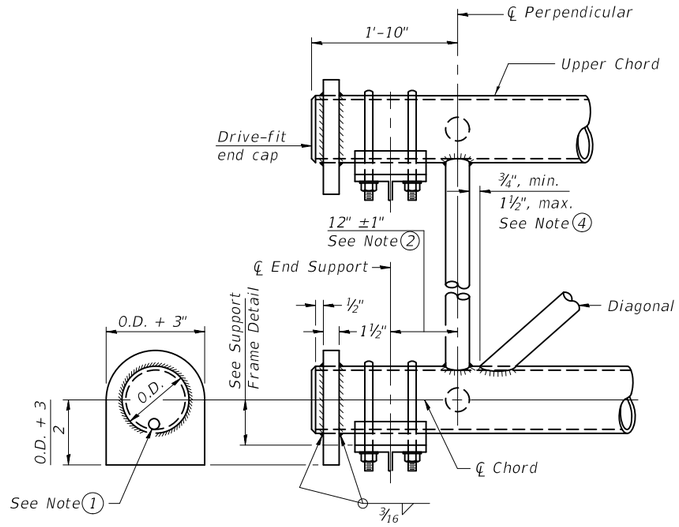
ELEVATION
TYPICAL INTERIOR UNIT

Even number of panels/interior unit required.
For two interior units, each unit may have even or odd number of panels.

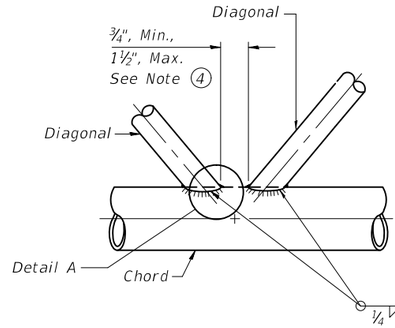


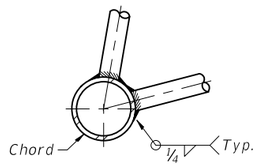
ELEVATION
TYPICAL EXTERIOR UNIT

Even or odd number of panels/exterior unit allowed.

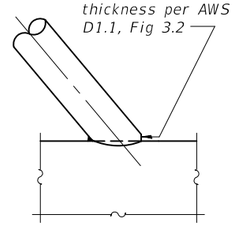


SUPPORT END DETAIL FOR EXTERIOR UNIT

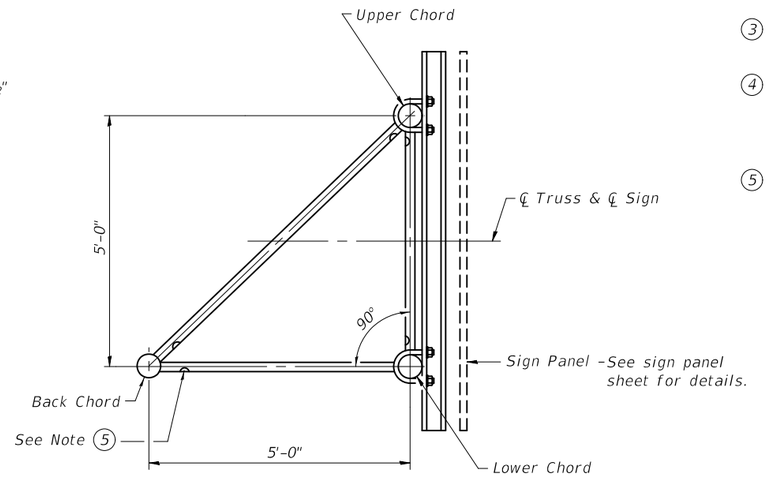




TYPICAL JOINT DETAILS



DETAIL A



SECTION A-A

NOTES

1. Contractor must use standard drive-fit cap to close end. The drive-fit cap must have a ½" Ø drain hole and must be installed after galvanizing. (Typ. at non-splice ends of chords)
2. 1'-10" end dimension may vary by ±1" to provide uniform panel spacing (P).
3. Panel spacing (P) shall be uniform for entire truss and between 4'-0" and 5'-0". (Fabricator may vary for uniform diagonals).
4. All diagonals shall be offset from the panel point based on the following: offset shall provide a ¾" minimum to 1½" maximum clearance between diagonal and any other diagonal, or perpendicular member, and to provide clearance for U-bolt connections of signs or walkway brackets.
5. Galvanizing vent holes of adequate size must be provided at each end of truss members except chords. Place on underside of sloping members and truss side of vertical members. Alternately, holes may be provided in wall of chords. All vent holes must be drilled and de-burred, typ.

TRI-S-2 2-17-2017

FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

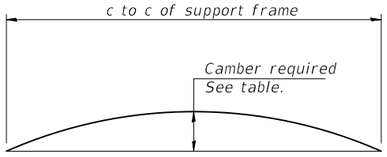
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TRI-CHORD SIGN STRUCTURES - STEEL TRUSS DETAILS FOR TRUSS TYPES TRI-I-S, TRI-II-S AND TRI-III-S

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

TRICHORD UNIT TABLE

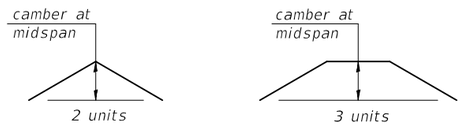
Structure Number	Station	Design Truss Type	Exterior Units (2)			Interior Unit			
			No. Panels per Unit	Unit Lgth.(Le)	Panel Lgth.(P)	No. Req'd.	No. Panels per Unit	Unit Lgth.(Li)	Panel Lgth.(P)



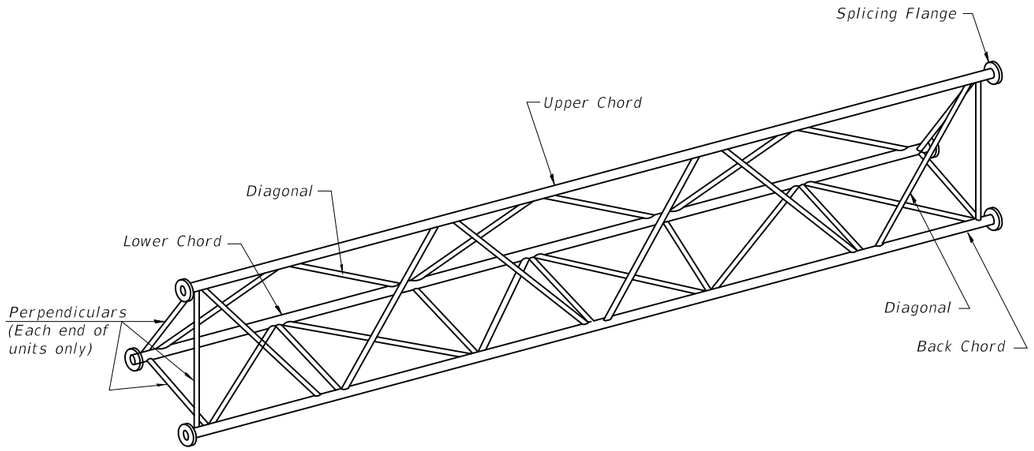
CAMBER DIAGRAM

Camber curve shown is theoretical. Actual camber attained by slope changes at splices between units.

CAMBER ATTAINMENT EXAMPLES:

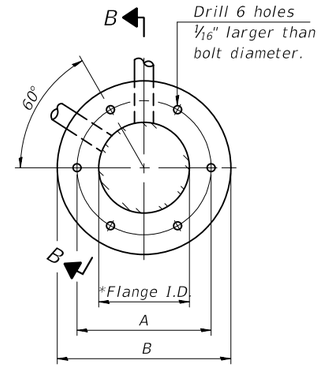


Camber shown is for fabrication only, measured with truss fully supported. (No-load condition)

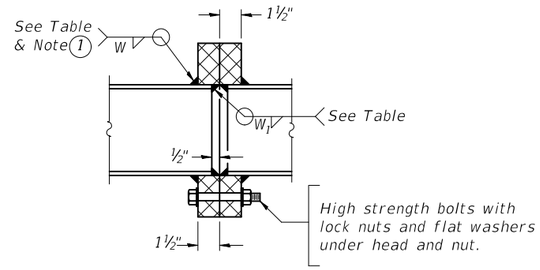


ISOMETRIC VIEW
TYPICAL INTERIOR TRUSS UNIT

Note:
Units shall be shipped individually with adequate provision to prevent detrimental motion during transport. This may require ropes between horizontals and diagonals or energy dissipating (elastic) ties to the vehicle. The Contractor is responsible for maintaining the configuration and protection of the units.



TRUSS TYPES I-S, II-S, & III-S



SECTION B-B

(1) Splicing Flanges shall be attached to each truss unit with the truss shop assembled to camber shown. Truss units shall be in proper alignment and flange surfaces shall be shop bolted into full contact before welding. Sufficient external welds or tacks shall be made to secure flanges until remaining welds are made after disassembly. Adjacent flanges shall be "match marked" to insure proper field assembly.

TRICHORD DESIGN TABLE

Truss Type	Maximum Span Length	Chords		Diagonals and Perpendiculars		*Camber at Midspan	Splicing Flange					
							H.S. Bolts		Weld Sizes			
		O.D.	Wall	O.D.	Wall		No./Splice	Diameter	W	W1	A	B
	(ft.)	(in.)	(in.)	(in.)	(in.)	(in.)	(each)	(in.)	(in.)	(in.)	(in.)	(in.)
TRI-I-S	80	4.500	0.237	2.875	0.203	2.25	6	7/8	1/4	3/16	8¼	11¼
TRI-II-S	100	5.563	0.258	2.875	0.203	3.25	6	7/8	3/8	1/4	9¼	12¼
TRI-III-S	120	6.625	0.280	2.875	0.203	5.00	6	1	3/8	1/4	11½	15
TRI-IV-S	140	8.625	0.322	3.500	0.216	6.25	6	1¼	9/16	7/16	13	16½

* Note to fabricator: For spans between maximum span lengths given in table, use linear interpolation to determine camber.
Minimum AASTO Camber = L / 1000

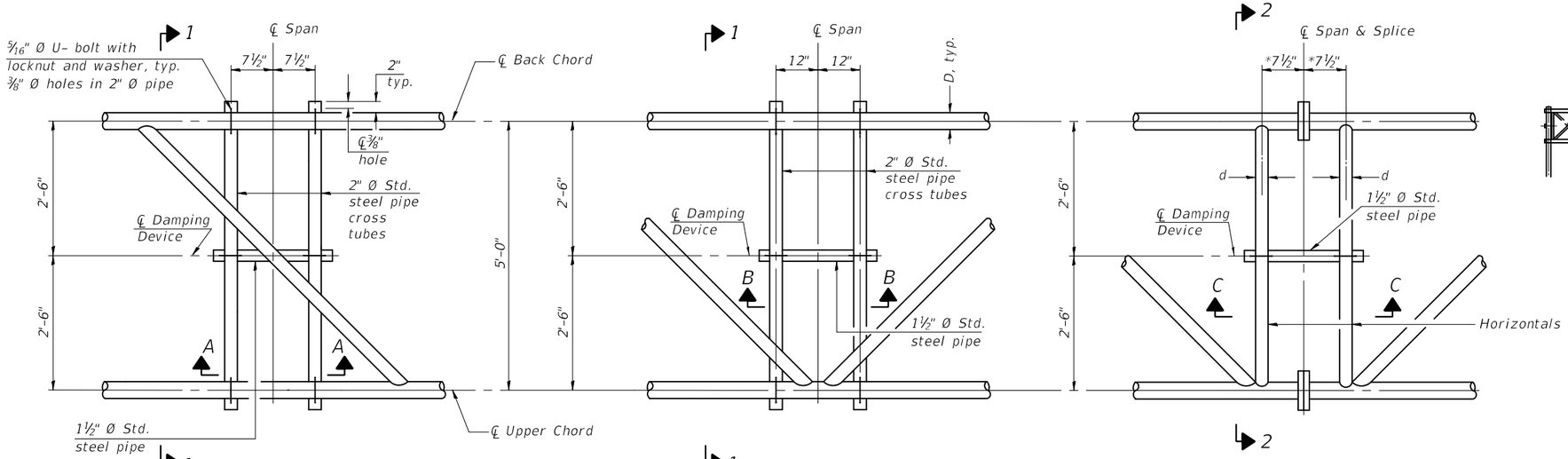
TRI-S-3 2-17-2017

FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TRI-CHORD SIGN STRUCTURES - STEEL TRUSS DETAILS FOR TRUSS TYPES TRI-I-S, TRI-II-S AND TRI-III-S

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		



PLAN DETAIL "A"

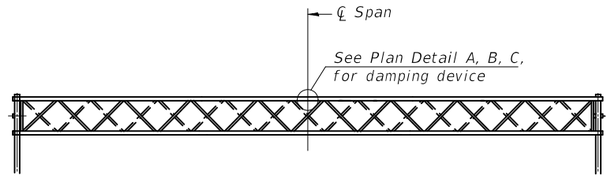
℄ SPAN BETWEEN PANEL POINTS

PLAN DETAIL "B"

℄ SPAN AT PANEL POINT

PLAN DETAIL "C"

℄ SPAN AT ℄ CHORD SPLICE

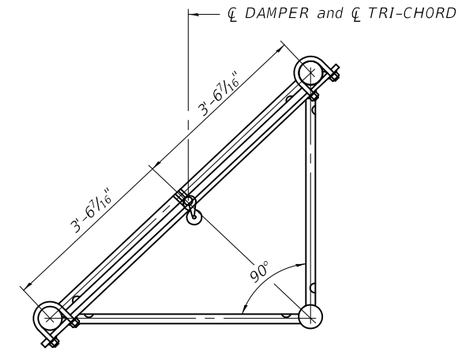


ELEVATION

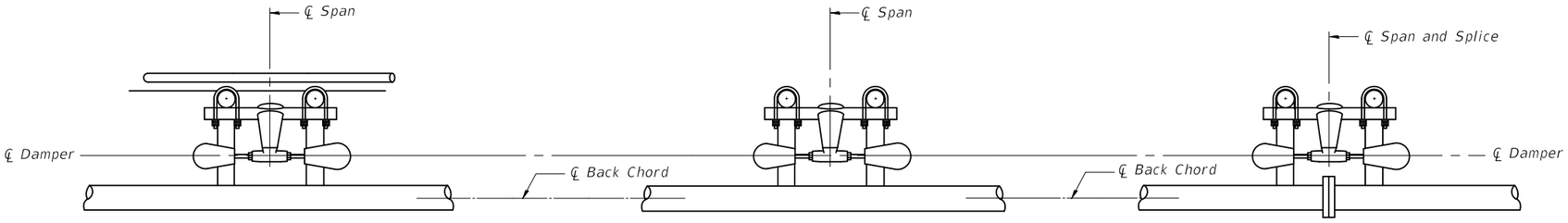
TRI-CHORD SIGN STRUCTURE

NOTES

Damper: One damper per truss. (31 Lbs. Stockbridge-Type - 29" minimum between ends of weights) Cost included in TRI-CHORD Sign Structure...



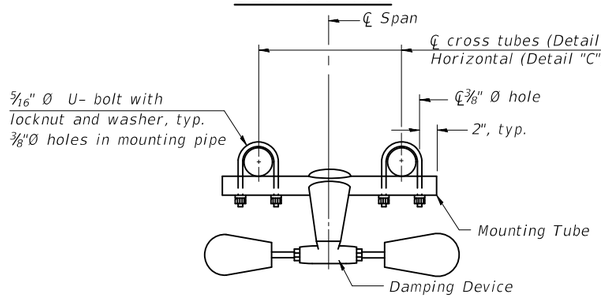
SECTION 1-1



SECTION A-A

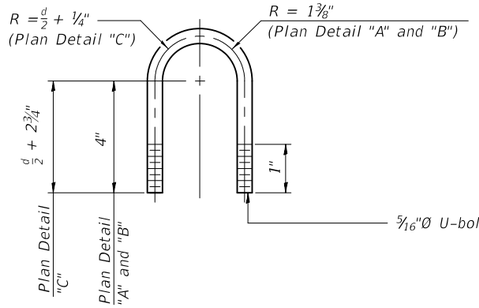
SECTION B-B

SECTION C-C



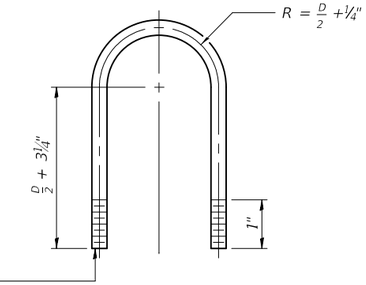
TRUSS DAMPING DEVICE CONNECTION DETAIL

(Typical)



DAMPING DEVICE MOUNTING TUBE U-BOLT DETAIL

(Typical)



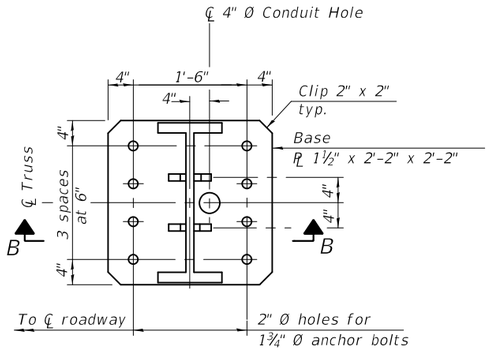
TOP CHORD TO CROSS TUBE U-BOLT DETAIL

(Typical - Detail "A" and "B")

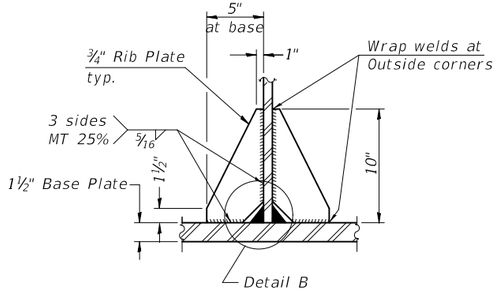
TRI-S-4 2-17-2017

FILE NAME =	USER NAME =	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	TRI-CHORD SIGN STRUCTURE DAMPING DEVICE
		CHECKED -	REVISED -		
	PLOT SCALE =	DRAWN -	REVISED -		
	PLOT DATE =	CHECKED -	REVISED -		

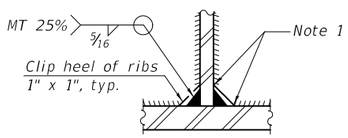
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		



SECTION A-A



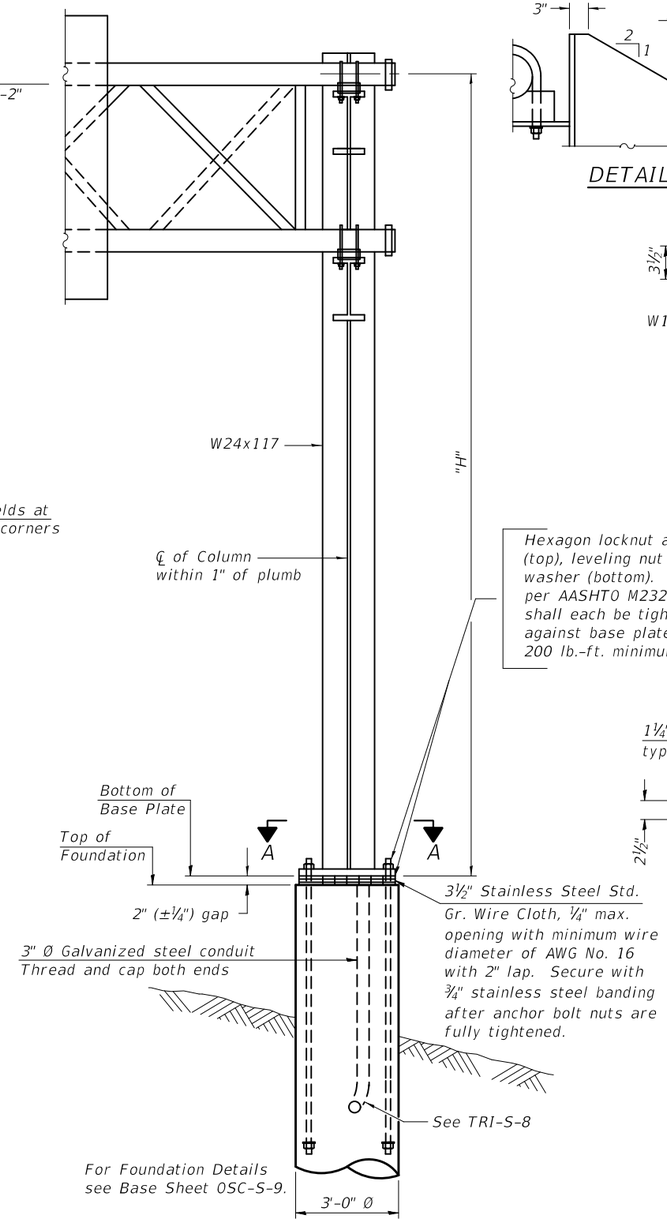
SECTION B-B



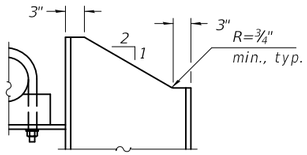
DETAIL B

(Typical rib)

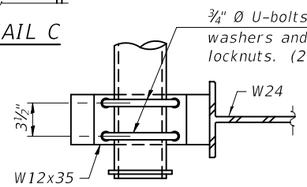
Note 1: Extend welds to clip to facilitate galvanizing.



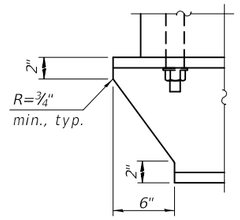
FRONT ELEVATION



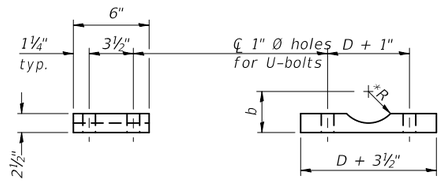
DETAIL C



SECTION C-C

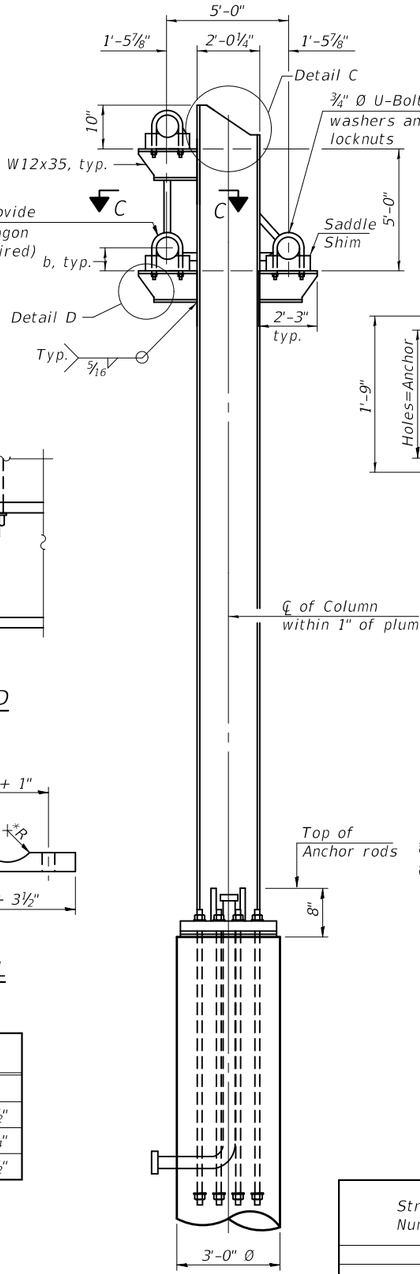


DETAIL D

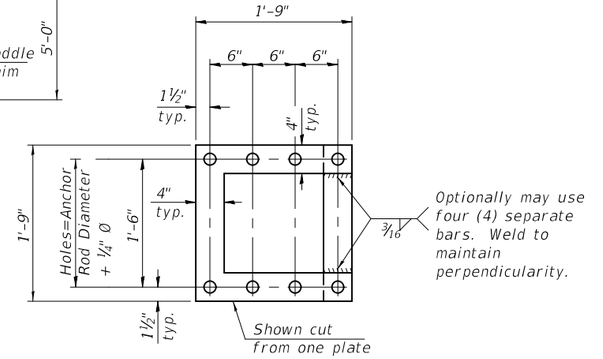


SADDLE SHIM DETAIL

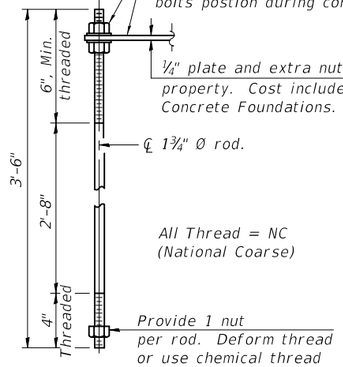
Chord Outside Diameter	R	b
4.500	2 5/16"	4"
5.563	2⅞"	4½"
6.625	3⅜"	4¾"
8.625	4⅜"	5½"



END ELEVATION



POSITIONING PLATE(S)



ANCHOR ROD DETAIL

Drilled Shaft Foundation

Structure Number	Station	Column		H (ft.)	Anchor Rod Diameter (in.)
		Left	Right		

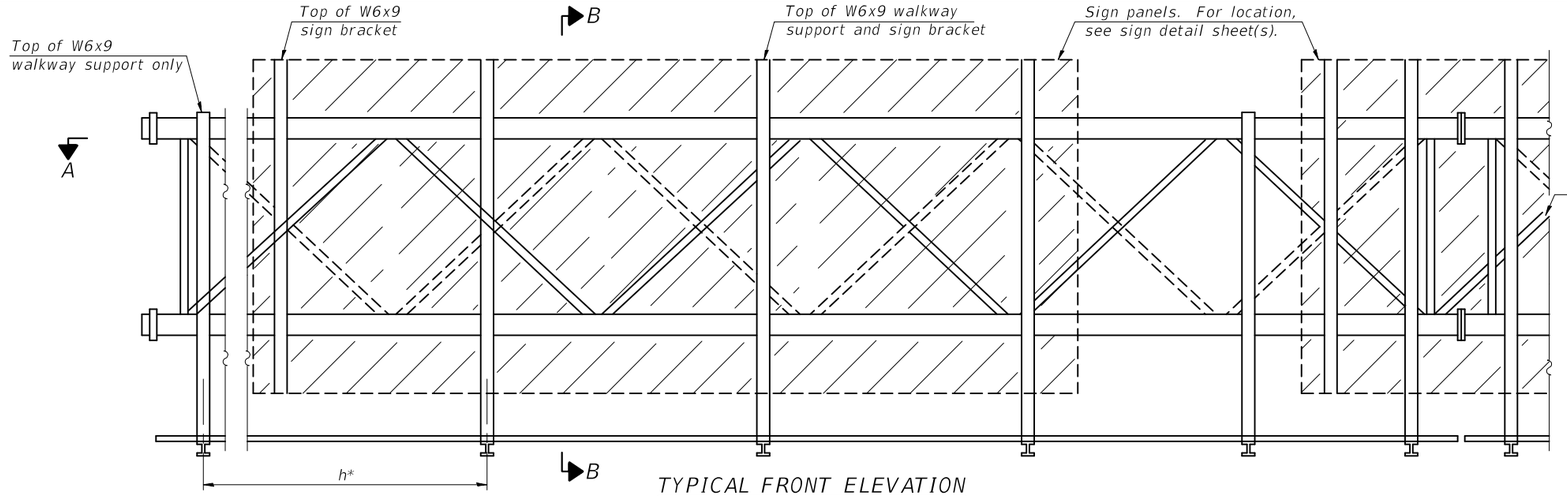
TRI-S-5 2-17-2017

FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

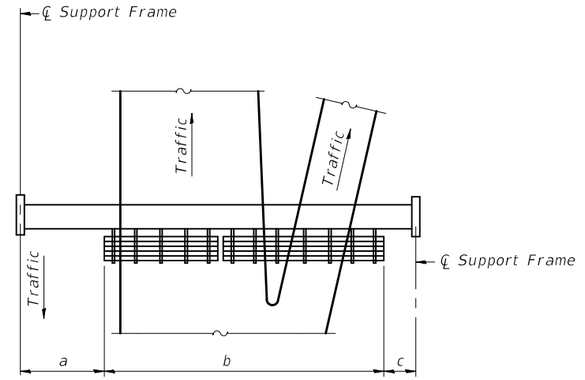
TRI-CHORD SIGN STRUCTURES - TRUSS SUPPORT COLUMN - STEEL TRUSS & STEEL POST

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			



TYPICAL FRONT ELEVATION

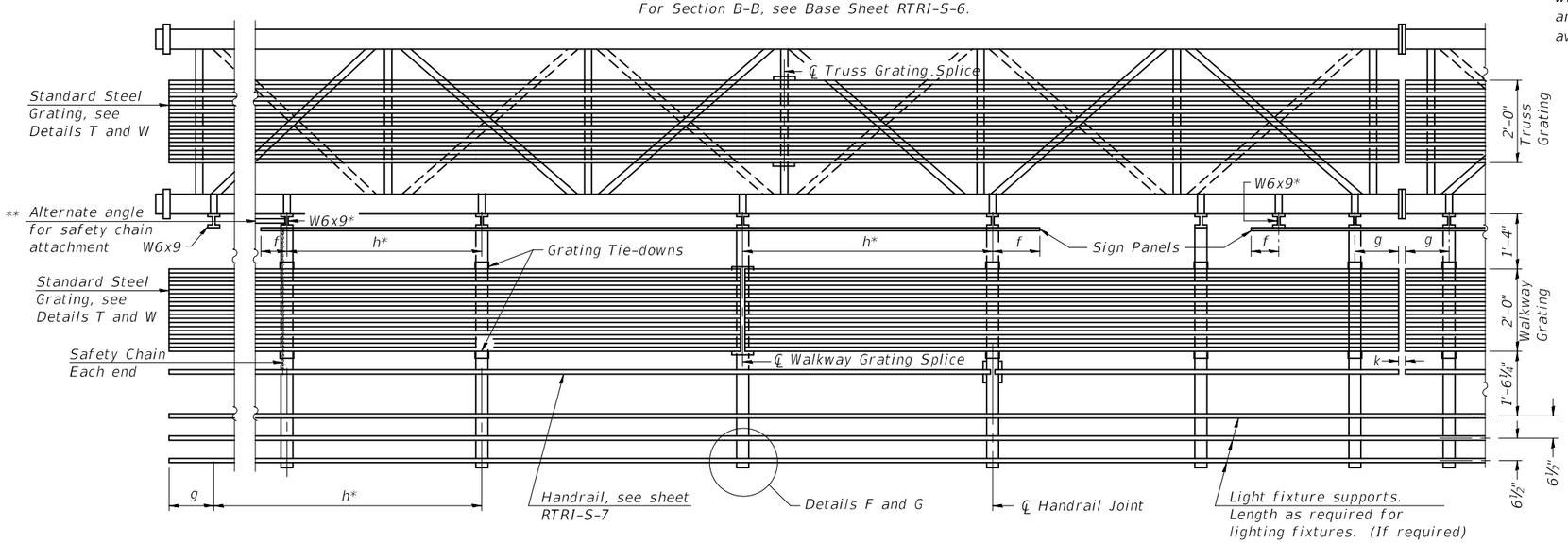
With lights and handrail omitted for clarity.
For Section B-B, see Base Sheet RTRI-S-6.



PLAN
WALKWAY AND HANDRAIL SKETCH

(Road plan beneath truss varies)

Walkway Grating
width dimensions is nominal
and may vary ±½" based on
available standard widths.



SECTION A-A

Handrail and walkway shall span a minimum of three brackets between splices and/or gap joints.
Place all sign and walkway brackets as close to panel points as practical.
Handrail joint, grating and light support splices placed as needed.

Truss grating to facilitate shall run full length (center to center of support frames) ±12" on overhead trusses. Cost of truss grating is included in "Overhead Sign Structure".

BRACKET TABLE

W6x9		
Sign Width		Number Brackets Required
Greater Than	Less Than or Equal To	
	8'-0"	2
8'-0"	14'-0"	3
14'-0"	20'-0"	4
20'-0"	26'-0"	5
26'-0"	32'-0"	6

Structure Number	Station	a	b	c	Walkway Grating and Handrail Lengths

Notes:

* Space W6x9 walkway brackets and sign brackets W6x9 for efficiency and within limits shown:

f = 12" maximum, 4" minimum (End of sign to ℄ of nearest bracket)
g = 12" maximum, 4" minimum (End of walkway grating to ℄ of nearest support bracket)
h = 6'-0" maximum (℄ to ℄ sign and/or walkway support brackets, W6x9)
k = 2" maximum gap between adjacent walkway grating sections and handrail ends

** If walkway bracket at safety chain location is behind sign, add angle to bracket, see Alternate Safety Chain Attachment on Base Sheet RTRI-S-7

For Details T and W, Section B-B and Grating Splice Details, see Base Sheet RTRI-S-6.
For Handrail Details see Base Sheet RTRI-S-7.

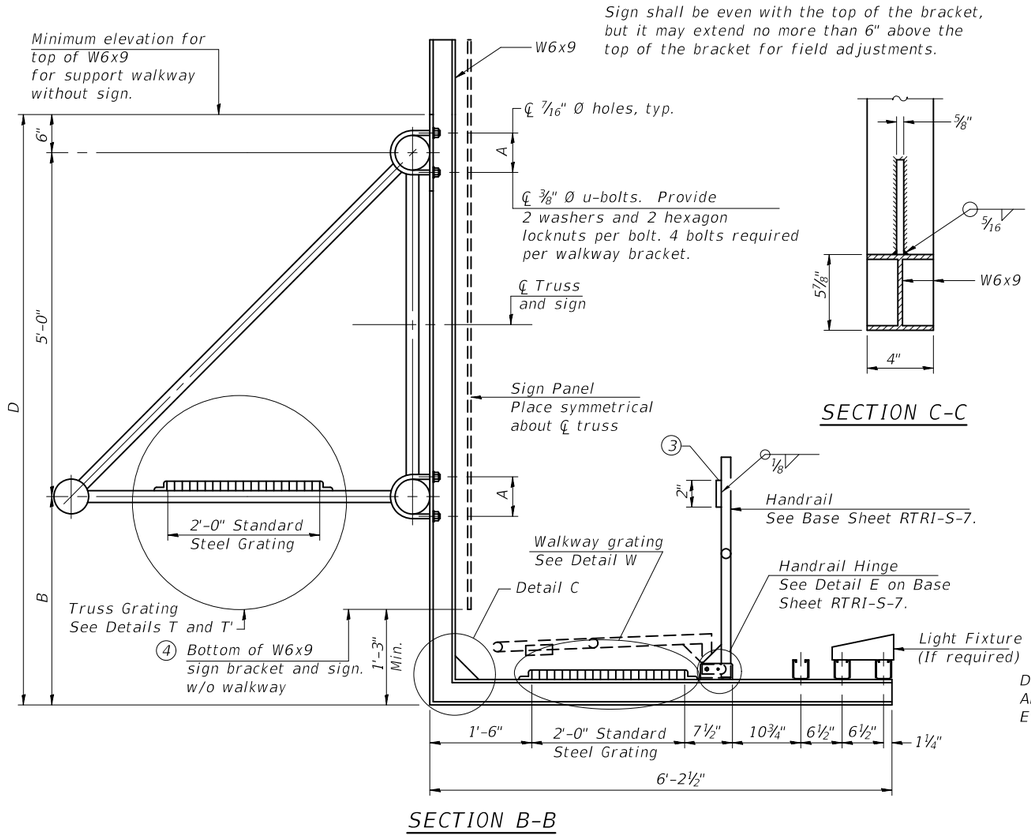
TRI-S-6 2-17-2017

FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

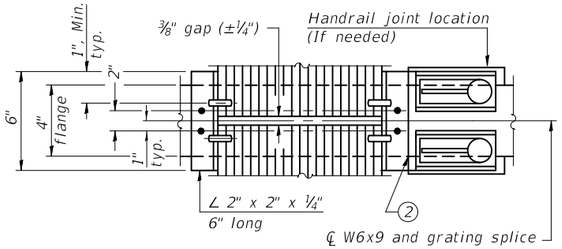
TRI-CHORD SIGN STRUCTURES
STEEL WALKWAY DETAILS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS FED. AID PROJECT			

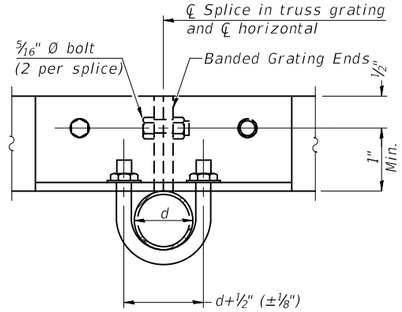


SECTION B-B

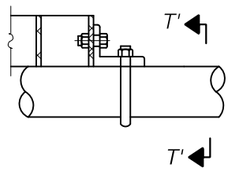
SECTION C-C



(AT WALKWAY GRATING SPLICE)

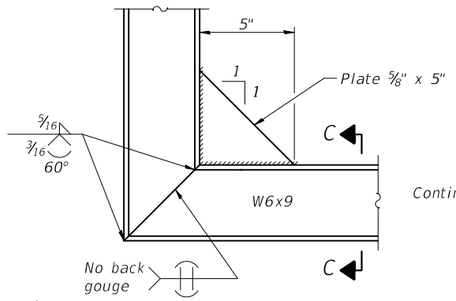


SECTION T'-T'

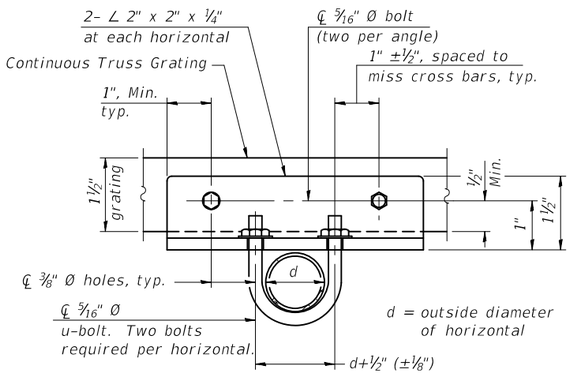


DETAIL T'

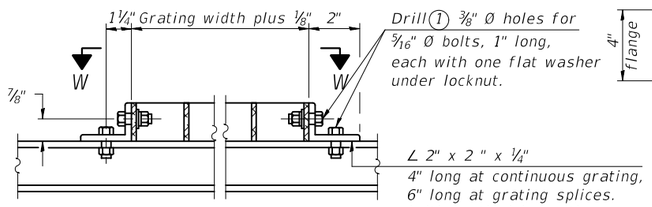
(Truss grating splice)
Details not shown same as Detail T.
Alternate materials may be used subject to the Engineer's review and approval.



DETAIL C

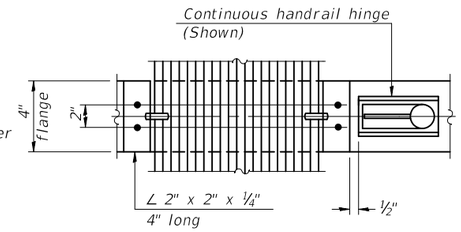


SECTION T-T



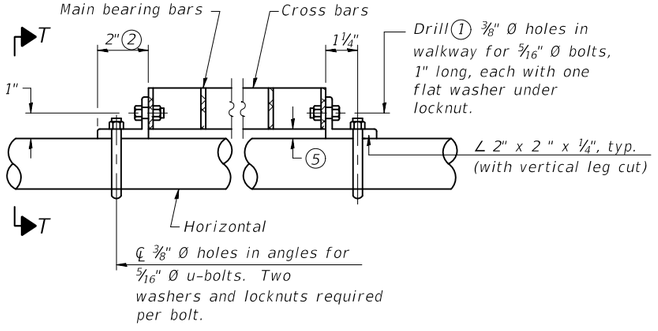
DETAIL W

(Walkway grating)



(CONTINUOUS WALKWAY GRATING)

SECTION W-W



DETAIL T

(Continuous Truss grating)

BARS SIZES FOR STANDARD STEEL GRATING

WALKWAY GRATING — Main bearing bars 3/16" x 1½" on 1 3/16" centers. Cross bars 3/16" x 1½" on 4" centers. All intersects welded.

Structure Number	Station	⑥ A	B	⑥ D

1. Drilling holes in grating may be done in shop or field, based on Contractor's preference and subject to accurate alignment.
2. If Handrail Joint present, weld angle to W6x9 and ¼" extension bars. (See Base Sheet TRI-S-7.)
3. PL ⅛" x ½" x 2" welded to handrail posts to protect locations that contact grating.
4. For projects that don't require walkway and lighting.
5. Tube to grating gap may vary from 0 to ½", max. to align walkway, allow for camber, etc.
6. Based on actual height of tallest sign given on TRI-S-1.

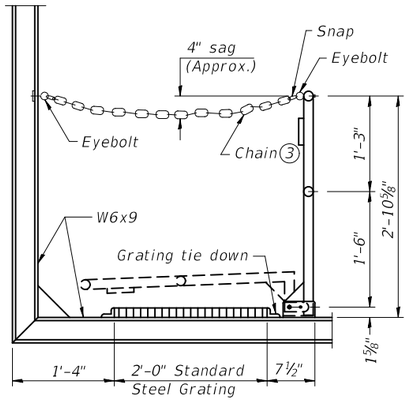
TRI-S-7 2-17-2017

FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

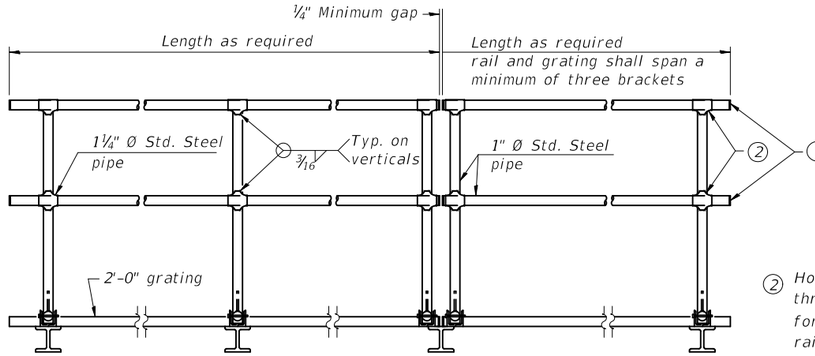
TRI-CHORD SIGN STRUCTURES - STEEL
SIGN BRACKET AND WALKWAY DETAILS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		



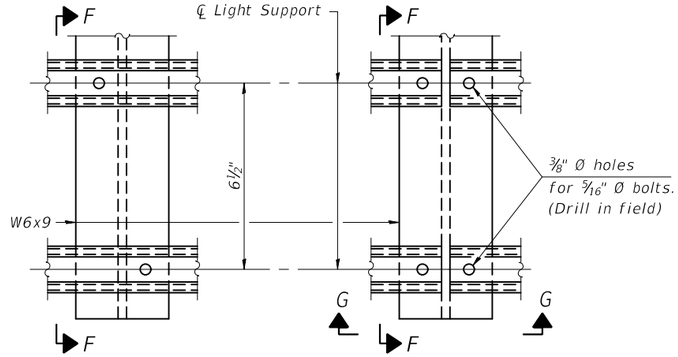
SIDE ELEVATION

(Showing safety chain w/o sign)



① Install standard force-fit end caps or weld ⅛" end plates with ⅛" c.f.w. and grind smooth. (All rail ends)

② Horizontal handrail member shall be continuous thru 1¼"Ø pipe. Provide 7/16" Ø hole in 1¼"Ø pipe for ⅜" Ø bolt. Field drill 7/16" Ø hole in horizontal rail member. Provide washer and locknut for bolt. (Use 5/16" eyebolts in 7/16" Ø holes on top rail at ends only.)

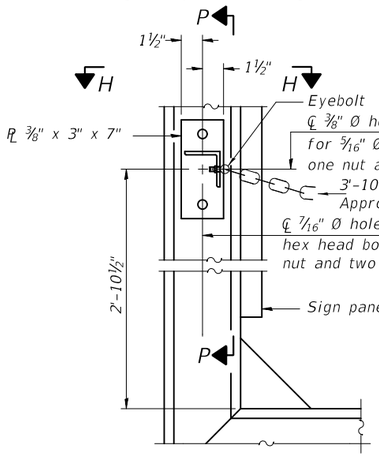


DETAIL F

DETAIL G

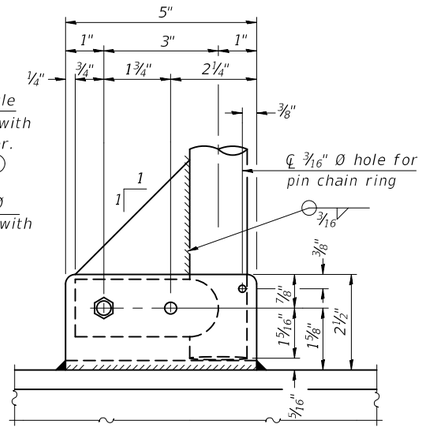
HANDRAIL DETAILS

FRONT ELEVATION

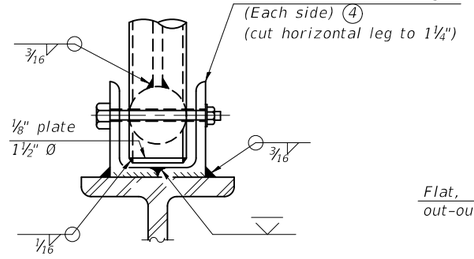


ALTERNATE SAFETY CHAIN ATTACHMENT

(With Sign Present)
Items not shown same as "Side Elevation" of "Handrail Details"

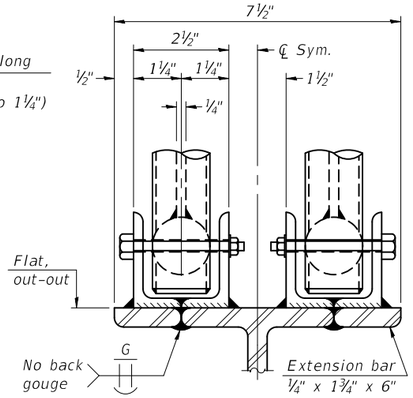


SIDE ELEVATION

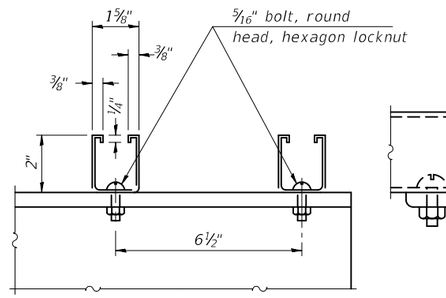


FRONT ELEVATION

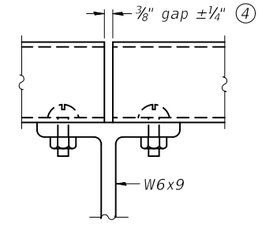
See "ELEVATION" at right for dimensions.



ELEVATION AT HANDRAIL JOINT



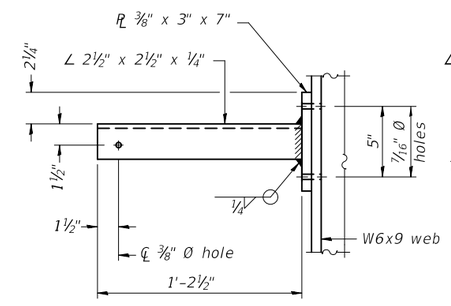
SECTION F-F



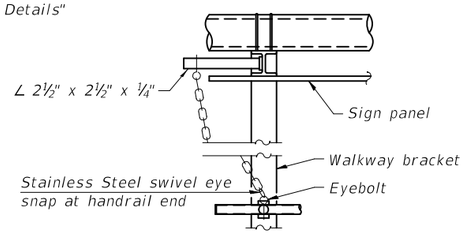
SECTION G-G

LIGHTING FIXTURE MOUNTS (IF REQUIRED)

④ Field cut ends of light support channels shall be free of burrs or hazardous projections and coated with zinc-rich primer or equivalent.

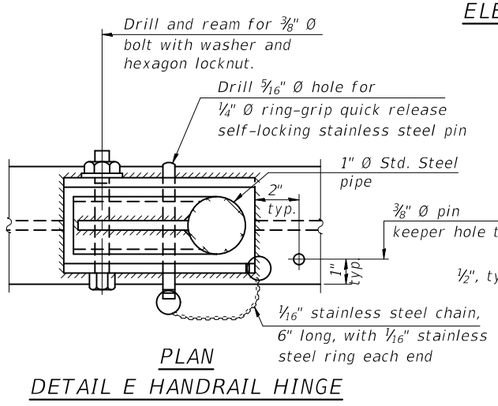


SECTION P-P



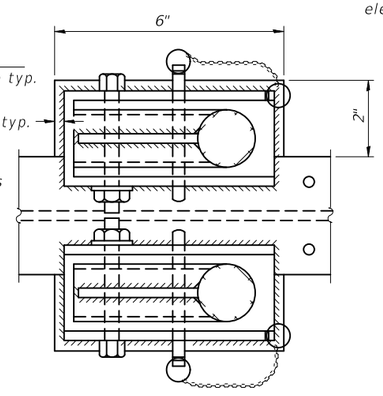
VIEW H-H

Details not shown similar to "Safety Chain" Details (Walkway omitted)



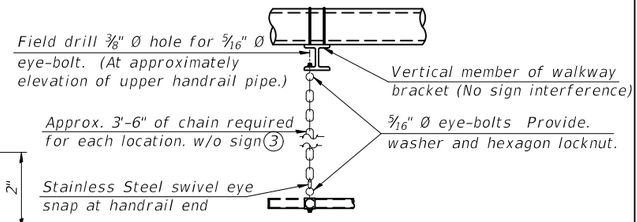
PLAN

DETAIL E HANDRAIL HINGE



PLAN AT HANDRAIL JOINT

Details not shown same as "PLAN"



SAFETY CHAIN

One required for each end of each walkway.

③ 3/16" Type 304L stainless steel chain, approximately 12 links per foot.

TRI-S-8 2-17-2017

FILE NAME =	USER NAME =	DESIGNED -	REVISED -
		CHECKED -	REVISED -
	PLOT SCALE =	DRAWN -	REVISED -
	PLOT DATE =	CHECKED -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TRI-CHORD SIGN STRUCTURES
HANDRAIL DETAILS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.

CONTRACT NO.

ILLINOIS FED. AID PROJECT

* Grind anchor rod to bright finish at ground clamp location before installing clamp.

NOTES:

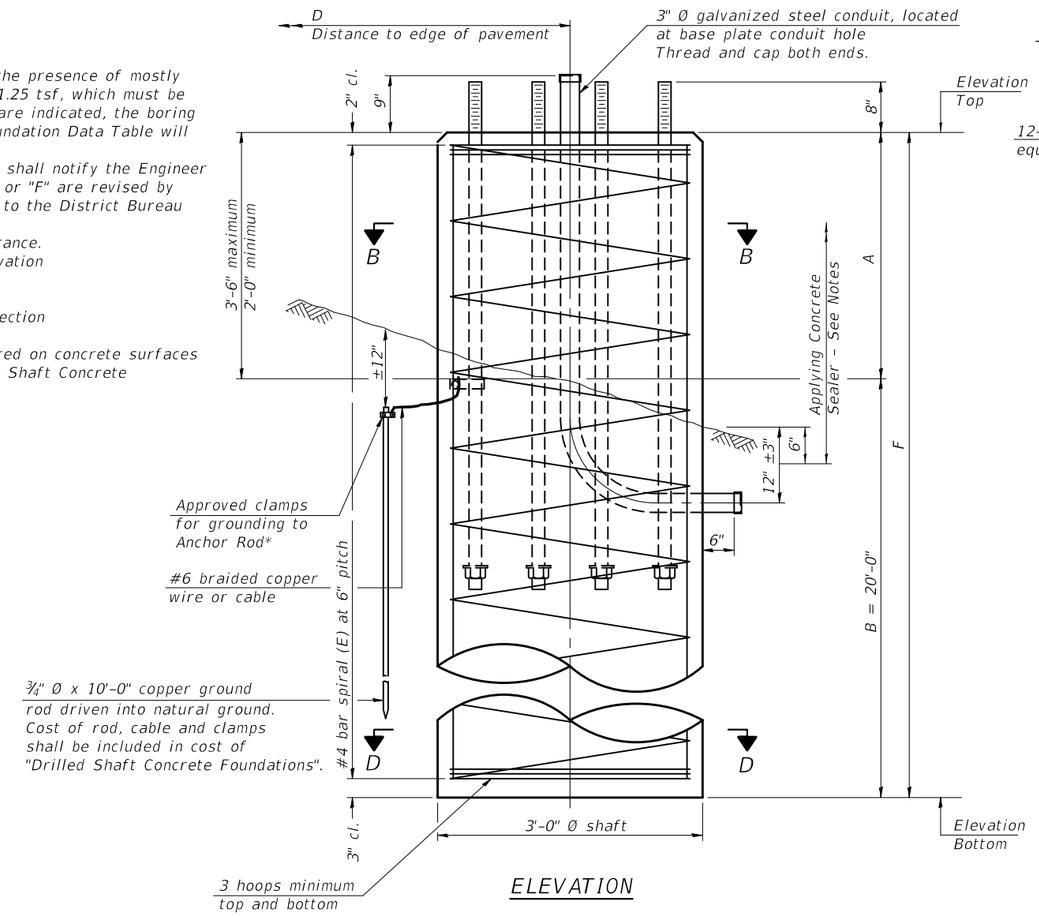
The foundation dimensions shown in the Foundation Design Table are based on the presence of mostly cohesive soils with an average Unconfined Compressive Strength (Qu) of at least 1.25 tsf, which must be determined by previous soil investigations at the jobsite. When other conditions are indicated, the boring data will be included in the plans and the foundation dimensions shown in the Foundation Data Table will be the result of site specific designs.

If the conditions encountered are different than those indicated, the Contractor shall notify the Engineer to determine if the foundation dimensions need to be modified. If dimensions "B" or "F" are revised by more than 12" by the Contractor, "as-built" plans shall be prepared and submitted to the District Bureau of Operations for future reference.

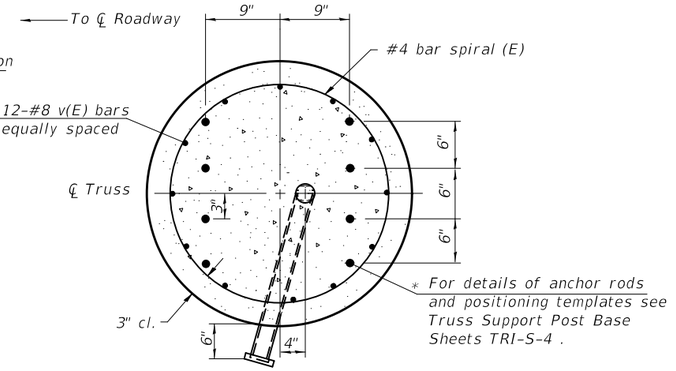
No sonotubes or decomposable forms shall be used below the lower conduit entrance. Permanent metal forms or other shielding may not be left in place below that elevation without the Engineer's written permission.

Concrete shall be placed monolithically, without construction joints. Backfill shall be placed per Article 502 of Standard Specification and prior to erection of support column.

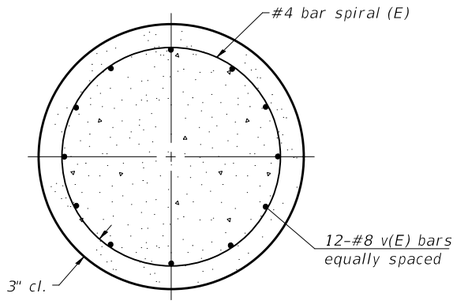
A normal surface finish followed by a Concrete Sealer application will be required on concrete surfaces above the lowest elevation 6" below finished ground line. Cost included in Drilled Shaft Concrete Foundation.



ELEVATION



SECTION B-B
3'-0" Ø shaft



SECTION D-D
3'-0" Ø shaft

FOUNDATION DATA TABLE

Structure Number	Station	Truss Type	Left Foundation				Right Foundation				Class DS Concrete (Cu. Yds.)
			Elevation Top	Elev. Bottom	B	F	Elevation Top	Elev. Bottom	B	F	

TRI-S-9 2-17-2017

FILE NAME =	USER NAME =	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	TRI-CHORD SIGN STRUCTURES - DRILLED SHAFT STEEL TRUSS & STEEL POST
		CHECKED -	REVISED -		
	PLOT SCALE =	DRAWN -	REVISED -		
	PLOT DATE =	CHECKED -	REVISED -		

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
	ILLINOIS	FED. AID PROJECT		